

Conc Spring

A FIRE DEPARTMENT IN ITSELF



**NATIONAL
FIRE EXTINGUISHER
COMPANY**

PHILADELPHIA · PENNSYLVANIA

A LITTLE FIRE IS QUICKLY TRODDEN OUT;
WHICH, BEING SUFFERED, RIVERS CANNOT QUENCH.

Shakespeare

THE "HI-PRESSURE" STATIONARY CHEMICAL FIRE EXTINGUISHER



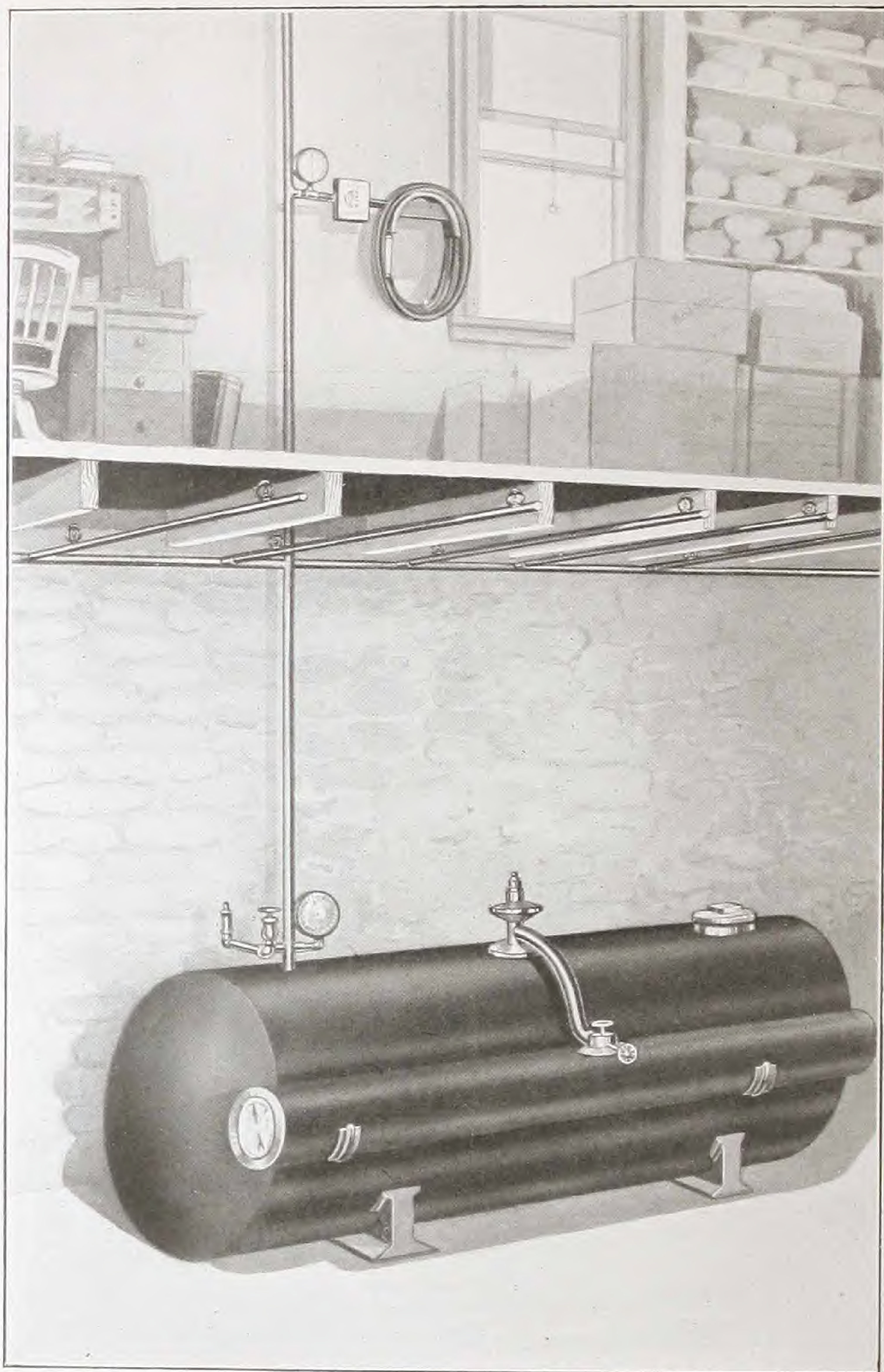
THE MOST EFFICIENT FIRE EXTINGUISHER
FOR THE PROTECTION OF

FINE RESIDENCES,
COUNTRY HOMES, CLUBS, STORES,
HOTELS, GARAGES, PUBLIC BUILDINGS, SCHOOLS,
LIBRARIES, CHURCHES, THEATERS, HOSPITALS, INSTITU-
TIONS, MILLS, FACTORIES, WAREHOUSES, LUMBER-YARDS,
WHARVES, FREIGHT HOUSES, GRAIN ELEVATORS,
STEAMBOATS, YACHTS, AND VESSELS
OF ALL KINDS

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NATIONAL
FIRE EXTINGUISHER COMPANY
PHILADELPHIA · PENNSYLVANIA

1915



The "Hi-Pressure" Fire Extinguisher *is instantly available when a fire starts.* It provides a large supply of powerful, non-injurious, fire-extinguishing chemical solution through automatic sprinkler-heads, or through chemical hose for operator's use, or both.

THE "HI-PRESSURE" CHEMICAL FIRE EXTINGUISHER

BRIEFLY

THE "HI-PRESSURE" Chemical Fire Extinguisher, installed in any building, is A FIRE DEPARTMENT IN ITSELF, and provides a large supply of chemical fire-extinguishing solution under pressure, and suitable piping and necessary lengths of chemical hose, with $\frac{1}{4}$ -inch shut-off nozzle, to be handled by an operator at the nearest available hose-station, by simply opening one valve.

The required number of hose-stations are conveniently located throughout the building.

An installation of automatic sprinkler-heads can also be included, automatically set into operation by the fire itself.

The "Hi-Pressure" stream of chemical solution has from 80 to 160 times the fire-fighting efficiency of water, and it is *not injurious* to flesh or fabric.

The "Hi-Pressure" fire apparatus is inexpensive to install, and costs little or nothing to maintain.

Any one can operate it—through the hand-hose; or it will operate itself—through the automatic sprinkler-heads.

It is the greatest possible fire-fighting protection that can be had.



Many Millions of Dollars' Worth of Property Was Jeopardized by This Fire
in Atlantic City, N. J.

A "Hi-Pressure" Stationary Chemical Fire Extinguisher Would
Have Snuffed It Out Before It Could Have Gained Any Headway.

FIRE LOSS

THE FIRE LOSS in the United States amounts each year to something like *two hundred and fifty millions of dollars!*

Every penny of this is an *absolute waste*, for property values are annihilated, and the world is just that much poorer. Directly or indirectly the loss is shared by all. This is a much different proposition from that involved in a mere change of ownership, where one's loss may be another's gain.

It is undeniable that almost all of this enormous annual fire waste, with its attendant loss of life, could be avoided if adequate means of extinguishing fire were *instantly available at the place and at the time* the fire starts.

Fire-resisting construction and the application of fire-preventing principles will reduce fire losses, *but there will always be fires!*

The smallest fire, which is easily extinguished if the proper apparatus is at hand, may quickly develop into a conflagration. Small fires can be put out without difficulty. Large fires usually have to *burn out!*

Fire protection engineers agree that adequate, efficient fire-extinguishing apparatus *installed within a building* assures the greatest possible fire protection.

The "Hi-Pressure" Stationary Chemical Fire Extinguisher is the simplest and most efficient fire apparatus ever devised. It is easily installed in any structure, and can be operated automatically through sprinkler-heads, or by hand-hose at conveniently located hose-stations, or both. It furnishes a powerful, steady stream of fire-extinguishing solution from 80 to 160 times as effective as water, and 4 times as effective as the stream from city fire department chemical apparatus.

The "Hi-Pressure" stream is *not injurious* to flesh or fabric, and its use on a fire *saves water damage*.

FIRE AND ITS EXTINGUISHMENT

THERE is no longer any mystery about fire, and no magic about its extinguishment. Fire-extinguishing is a simple, scientific problem, and the ways and means are well known. The only difficulty is

to have these known means instantly available and in sufficient quantity—an impossibility in the case of large conflagrations. The right time to fight any fire is at the very moment it starts, and the true advance in the science of fire-fighting can only be along the line of developing adequate fire-fighting means available for instant use in the building to be protected.

What is fire? What conditions are necessary for its existence? How can those conditions be overcome so that it cannot exist?

To answer that "Fire is something burning" tells us nothing. It was not until 1786, only one hundred and twenty-nine years ago, that Lavoisier told us exactly what fire is. Before then nobody really knew—or, at least, nobody had revealed the knowledge. "Fire," said Lavoisier, "is the combination of a substance with oxygen."

To have fire, therefore, *oxygen must be present*. And not only must the oxygen be present with the substance with which it is combining, but they must be together *at a temperature above the burning-point*. For instance, there may be paper on a wooden table, and there is oxygen in the surrounding air, and yet the paper and the wood are not burning. They are present with oxygen, it is true, but not at a temperature above the burning-point.

So then there are two conditions that are absolutely essential in order to have fire; but all fire, whether it be the slow process of rust, or the quicker process of a conflagration, when a building, a block, or a whole city is a mass of flames, is simply the combination of some substance with oxygen.

As there are only two conditions that are necessary in order to have fire, there can only be two ways to extinguish fire. The best and quickest way, if it were only practical and possible in every instance, is to separate the oxygen (air) from the substance with which it is combining. They *must* combine in order to have fire; therefore, to separate them and to prevent their combining is to extinguish the fire, or, as is commonly said, to *smother* it! That is the first way. The second way is to reduce the temperature below the burning-point.

Every fire that ever was extinguished was put out by one or the other, or by both, of these two methods, or else it burned itself out. There is no other way.

WATER

WATER extinguishes fire because it is normally not a supporter of combustion, and because it reduces the temperature by taking heat from the fire and using it to change the water into steam; and because it also tends, both by itself and by means of the steam, to form a blanket or covering over the burning material, thus separating it from the air (oxygen) and smothering the fire.

Water extinguishes fire more by cooling than by smothering—that is, its efficiency is much greater in the *slower* (cooling) method than in the faster (smothering) method of putting out fire.

The main advantage in using water for fire-fighting purposes is the fact that usually it is easily obtained in unlimited quantities.

The large quantities of water necessary to put out a fire are frequently the cause of greater damage than is occasioned directly by the fire itself, especially where comparatively small but stubborn fires occur in upper stories, necessitating the flooding of the building.

Water has no efficiency on burning grease or oils, as they float on water and continue to burn, spreading the fire wherever the stream flows.

CHEMICAL SOLUTION

THE SOLUTION USED in chemical fire apparatus is much more efficient for fire-extinguishing purposes than plain water, because the chemical solution does everything that water can do, exactly in the same way and for exactly the same reasons, and it does something more that water cannot do—that is, it forms a considerable blanket of fire-extinguishing gases which are heavier than air and non-supporters of combustion, and thus shut off much more effectively the access of air (oxygen) to the fire.

Chemical fire apparatus solution extinguishes fire more by smothering than by cooling—that is, its efficiency is much greater in the *faster* (smothering) method than in the *slower* (cooling) method of putting out fire.

No knowing person can question the superiority of chemical solution over water for fire-fighting purposes. The only drawback is

that the supply of chemical solution must necessarily be comparatively limited. However, a reasonable supply of chemical solution, *instantly available*, makes a large supply of water unnecessary.

In the ordinary chemical fire apparatus, popularly known as the "soda-and-acid" type, whether it be the 3-gallon hand-extinguishers more or less familiar to all, or the 40-gallon chemical tanks on city fire department apparatus, a solution of bicarbonate of soda (baking soda) and water is used, into which sulphuric acid (vitriol!) is dumped whenever it is desired to set the apparatus into action. The resultant chemical action transforms the solution partially into carbonic-acid gas (carbon dioxid, CO_2). This gas is the fire-extinguishing principle, it being heavier than air and a non-supporter of combustion. It also forms the power or pressure that expels the solution from the chemical tank. Such portion of this gas as is soluble in the solution at its temperature is carried by the stream to the fire. The greater portion is utilized for pressure, and is *behind* the stream, *not* in it, and never reaches the fire, and is, therefore, wasted so far as fire extinguishing is concerned.

All "soda-and-acid" tanks are dangerous unless the proper space ($\frac{1}{7}$ to $\frac{1}{5}$ empty) is provided for the collection of the gas. When once set into action, the entire contents must be used or wasted, and, even if not used, the solution must be replaced at least once a year.

All "soda-and-acid" chemical fire apparatus requires the use of injurious, corrosive, highly dangerous sulphuric acid—vitriol!

THE "HI-PRESSURE" SOLUTION

IN THE "Hi-Pressure" Chemical Fire Extinguisher *no sulphuric acid or other dangerous chemical is used*, and no chemical action takes place in the chemical tank. The solution is forced on the fire by compressed air or by liquid carbonic-acid gas, and *any desired solution can be used*. Using a plain bicarbonate of soda solution (no sulphuric acid is necessary), the heat of the fire transforms the solution partially into carbonic-acid gas, positively placing on the fire *four times as much carbonic-acid gas* as is possible with any "soda-and-acid" chemical fire apparatus of equal capacity, and giving *four times the fire-extinguishing efficiency*.

This truth can be proved by a comparative test on actual fires, and by reports of chemists of national repute. (See pages 25-31.)

The "Hi-Pressure" stream is *not injurious* to flesh or fabric, and its use on a fire *saves water damage*.

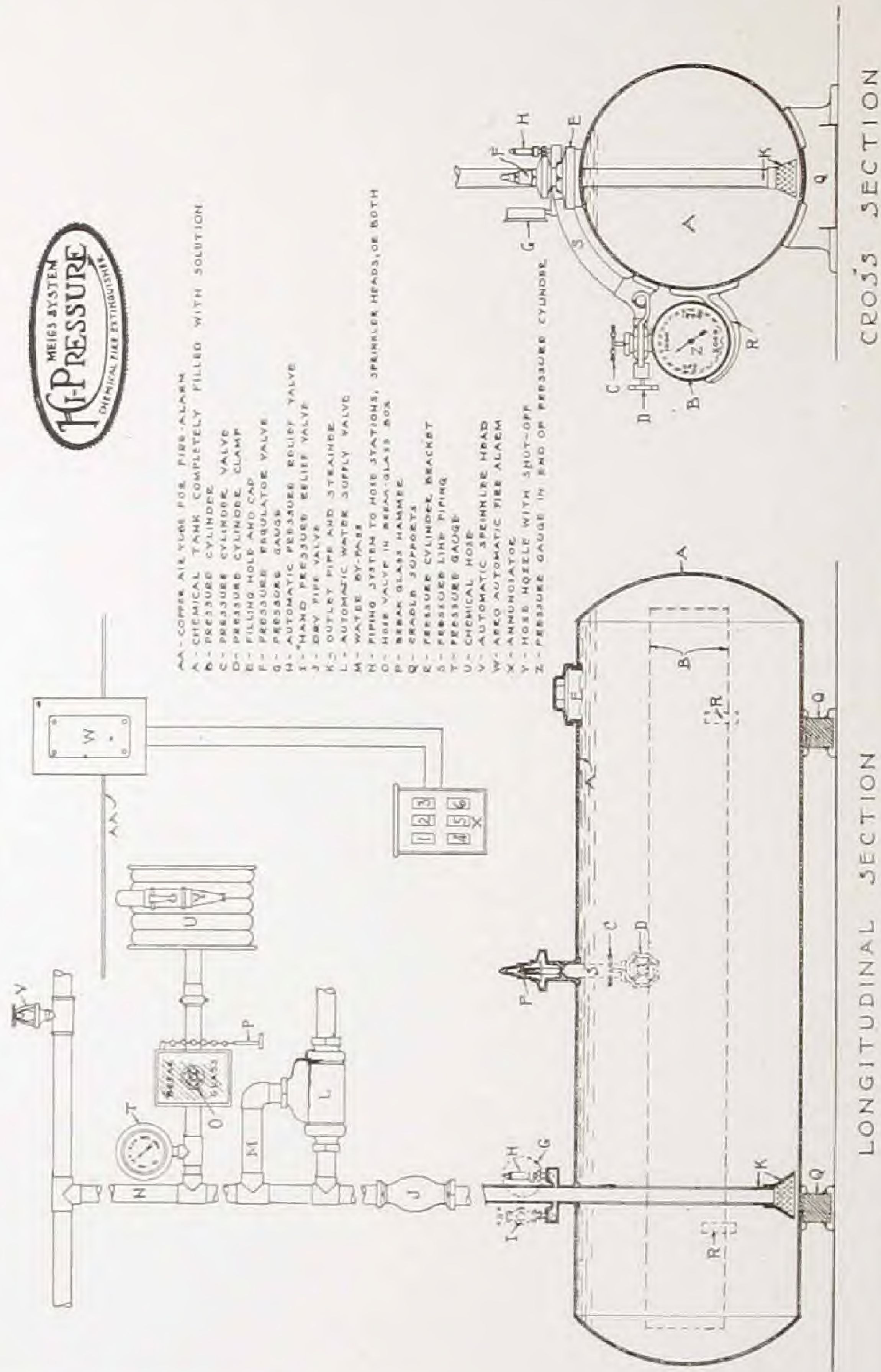
FIRE-EXTINGUISHING AND FIRE-PROOFING

THE "Hi-Pressure" Chemical Fire Extinguisher extinguishes fire much more effectively than any "soda-and-acid" chemical fire apparatus, not only because it utilizes *four times* as much carbonic-acid gas and 25 per cent. more solution in the same size of tank, but also because, being able to use *any* suitable solution, its stream can include salts that have flame-proofing as well as fire-extinguishing qualities.

The originators of the "Hi-Pressure" apparatus were the first to appreciate, develop, and apply the advantages of fire-proofing along with fire-extinguishing means. The "Hi-Pressure" stream temporarily flame-proofs burning material at the time it partially extinguishes it, thus preventing even large fires from gaining headway, and gradually reducing them until they are small enough to be handled easily. With the "Hi-Pressure" apparatus a large fire is simply a group of many little fires, each one of which is easily put out and then flame-proofed to a certain extent so that it *stays out!*

The "Hi-Pressure" Stationary Chemical Fire Extinguisher is offered with the absolute guarantee that it is *the most efficient fire-extinguishing device that can possibly be had*.

"HI-PRESSURE" STATIONARY CHEMICAL FIRE EXTINGUISHER COMBINATION HOSE AND SPRINKLER SYSTEM PATENT APPLIED FOR



The "Hi-Pressure" Stationary Chemical Fire Extinguisher is *instantly available when a fire starts*. Its stream is from 80 to 160 times as efficient as water, and 4 times as efficient as fire department chemical engines. Any one can operate it—through the hand-hose; or it will operate itself—through the automatic sprinkler-heads.

THE "HI-PRESSURE" STATIONARY CHEMICAL FIRE EXTINGUISHER

THE "Hi-Pressure" Chemical Fire Extinguisher is the most important and most efficient apparatus for extinguishing fire. It consists of a tank of any desired capacity, completely filled with a saturated solution of bicarbonate of soda and water. *Any other suitable solution can be used.* A separate cylinder holding compressed air or liquid carbonic-acid gas is connected to the chemical tank by piping through a pressure-regulating valve which automatically controls the pressure as desired. An extra interchangeable air-cylinder is included with each chemical tank, and empty air-cylinders are recharged at a nominal cost. A gage in each pressure-cylinder shows the amount of pressure available at all times. The chemical tank is also fitted with a pressure-gage, an automatic pressure-relief or safety-valve, a hand pressure-relief valve, and a hand-hole with cover for filling purposes. Each chemical tank is connected to a standpipe rising to the different stories, with branches to suitable hose-stations on each floor, or to automatic sprinkler-heads, or to both. Each hose-station is equipped with the necessary length of best quality $\frac{3}{4}$ -inch chemical hose with shut-off nozzle; also pressure-gage and hose-valve—the latter being inclosed in a box with "break-glass" front.

The unit installation can be repeated for large buildings, each unit protecting its particular zone.

The entire equipment can be used either as a *wet-pipe* or as a *dry-pipe* system.

“HI-PRESSURE” WET-PIPE SYSTEM

IF USED as a *wet-pipe* system, the pressure from the air-cylinder, or from the liquid carbonic-acid gas cylinder, is let into the chemical tank by opening valve on pressure-cylinder, forcing the solution throughout the entire pipe-line, both the tank and the piping being always full of solution. The pressure-gage on the chemical tank and at each hose station will register the pressure and show that the solution is present and instantly available. In case of fire, the automatic sprinkler-head will open at the location of the fire, same as with the water-sprinkler systems. But there is this important difference: The “Hi-Pressure” sprinkler-head utilizes a solution of bicarbonate of soda and water, having from 80 to 160 times the fire-fighting efficiency of water.

If an operator is present to handle the chemical hose from the nearest hose-station, by merely opening one valve, a stream of “Hi-Pressure” chemical solution through a $\frac{1}{4}$ -inch nozzle can be directed on the fire by hand, which will be much more effective than the operation of the sprinkler-head. One does not interfere with the other, and both can be operated at the same time.

The hose-stations are so located that at least two streams can be utilized on any one place.

“HI-PRESSURE” DRY-PIPE SYSTEM

IF USED as a *dry-pipe* system, where pipes are exposed to freezing, the same installation of automatic sprinklers, or hose-stations, or both, is furnished, and the pressure is let into the chemical tank in the same way—the chemical tank then being protected from frost in any suitable manner. But the chemical solution is shut out of the piping system and the piping is kept dry, by means of a suitable dry-pipe valve. The piping system is filled with air under a few pounds pressure. The releasing of this air, either by the fusing of an automatic sprinkler-head in case of fire, or by the opening of any hose-valve at any hose-station by an operator, automatically opens the dry-pipe valve, and the chemical solution is instantly available, same as before. The pressure-gage at each hose-station indicates the pressure in the piping-system at all times, and insures constant inspection and supervision.

After a fire is extinguished the pressure is shut off temporarily at the chemical tank, and the hand pressure-relief valve opened, when all the solution throughout the entire piping system will return to the chemical tank by gravity. The chemical tank can then be filled to replace any solution that has been used, the hand relief-valve closed, and the pressure again turned on. If necessary, the partially used pressure-cylinder can be replaced by the fully charged reserve cylinder, and the used cylinder sent to be re-charged.

The entire system can be inspected, tested, and proved at any time without loss of efficiency, without waste of chemical solution, and without putting the apparatus out of service.

THE "HI-PRESSURE" CHEMICAL SPRINKLER SYSTEM

THE standard Sprinkler systems consist of piping running close to the ceilings to carry a supply of *water* to sprinkler-heads placed from 8 to 10 feet apart, a blanket of water being automatically distributed by the opening of the sprinkler-head when subjected to sufficient heat—average 165° .

Its great advantages are that its operation is entirely automatic; it is independent of operators, firemen, water-hose connections, etc., and it is set into action by the fire itself, at the very place where the fire starts and while it is still in its incipency and easily controlled.

The "Hi-Pressure" Stationary Chemical Fire Extinguisher in connection with automatic sprinklers gives every fire-fighting advantage claimed for water-sprinkler systems. It also gives the important added advantage of utilizing a solution that indisputably has from 80 to 160 times the fire-fighting efficiency of plain water, extinguishing paint, grease, and oil fires on which water has only a baneful effect. It also provides means for directing this same highly efficient fire-extinguishing stream by hand through chemical hose and nozzle.

The "Hi-Pressure" Chemical Sprinkler System, including the necessary number of hose stations, is *much less expensive to install* than the water-sprinkler systems, as it is independent of water connections and saves the excessive cost of the two or more water supplies required for the regular sprinkler systems.

It can be installed in any place in any building where the best possible fire protection is desired, and especially in risks that need adequate sprinkler protection, but which cannot consider the regular water systems because of their excessive cost.

It will absolutely extinguish a fire that could not be controlled by water-sprinkler installations.

It provides, both automatically and for operators' use, fire-extinguishing means that are *efficient, adequate, and instantly available*, furnishing *the best possible fire-fighting protection that can be had*, and at a moderate cost.

AUTOMATIC FIRE ALARMS

AUTOMATIC fire alarm systems can be installed in connection with the "Hi-Pressure" Chemical Fire Extinguisher, so that an alarm is sent to any desired place automatically the moment the chemical apparatus is set into action or before.

THE SIMPLICITY OF THE "HI-PRESSURE" FIRE APPARATUS

THE great simplicity of the "Hi-Pressure" Chemical Fire Extinguisher is evidenced by the fact that really *there are no working-parts!* The entire apparatus is marvelously free from mechanism or complications of any kind. With the exception of the outlet pipe, there is nothing in the chemical tank but the chemical solution. When the hose-nozzle or sprinkler-head is opened, the pressure from the pressure-tank feeds into the chemical tank automatically, and forces the chemical solution through the outlet pipe and into the pipe-system. *The solution is the only thing that moves!* In the wet-pipe system there is absolutely no other operation, and in the dry-pipe system there is only the addition of a dry-pipe valve, which is entirely outside of the tank, and holds the solution back until the air-pressure in the piping system is released.

There is no acid bottle and no acid. There are no pistons or piston-rods; no springs, no levers, no "works," no mechanism, no complications, no fine adjustments, no delicate parts. There is nothing but a steady flow of chemical solution forced by the powerful and uniform pressure from compressed air or liquid carbonic-

acid gas. Nothing can be more simple, more certain in action, more free from liability to get out of order.

The "Hi-Pressure" Chemical Fire Extinguisher is the *most efficient* fire-fighter ever devised for incipient fires, as well as being the *simplest* and *surest*. Even the various valves and gages do not have to be of a special type, for standard types obtainable in the open market can be used.

THE COST OF INSTALLATION

THE cost of installing the "Hi-Pressure" Stationary Chemical Fire Extinguisher depends upon the number of chemical tanks required, the extent of piping system, the number of hose-stations and sprinkler-heads, the arrangement of floors, walls, etc. In other words, the cost depends upon the size and arrangement of the structure to be protected. Our local representatives will take all necessary measurements, data, etc., and give full information, furnishing complete blue-prints and specifications with our detailed formal proposals.

The simplicity of the "Hi-Pressure" apparatus insures that it can be installed at a lower price than is possible with any other efficient apparatus of this class.

Your local plumber can give you full information.

FOLLOWING THE CHEMICAL SOLUTION WITH WATER

THE "Hi-Pressure" Stationary Chemical Fire Extinguisher can also be connected with supply pipe from water-main, so that when the entire contents of the chemical tank are exhausted, the water supply will be turned on automatically for use through the chemical hose or the sprinkler-heads, or both.

The "Hi-Pressure" Chemical Apparatus can also be installed in connection with water-sprinkler systems already in place, interrupting the flow of water by the chemical solution, and automatically resuming the water supply after the chemical solution is exhausted.

All automatic sprinkler systems are designed to extinguish a fire in its incipency, or at least to hold it in check until the Fire Department arrives. Fires that could not possibly be controlled

or checked by water-sprinklers would be easily handled by the "Hi-Pressure" solution with its fire-fighting efficiency equal to 80 to 160 times that of plain water.

POINTS ABOUT THE "HI-PRESSURE" CHEMICAL FIRE EXTINGUISHER

It is always ready and instantly available, either for use automatically or by hand, without delays for fire alarms, firemen, water, hose-connections, etc.

It is a fire department in itself.

Any one can use it.

It provides a *large supply* of chemical fire-extinguishing solution.

Its fire-fighting efficiency is equal to that of from 80 to 160 times the same quantity of water, and 4 times that of the city fire department "soda-and-acid" apparatus.

Its stream is *not injurious* to flesh or fabric.

It does little or no water damage.

It is very efficient on grease, oil, and other fires on which water has little or no effect.

It has no delicate or complicated parts, and no moving mechanism to get out of adjustment.

It is entirely independent of water-supply, and does not have to be recharged until contents are actually used, as neither the solution nor the apparatus deteriorates from age.

It is as simple to operate as a garden-hose.

It cannot be "overcharged"; it cannot cause injury or damage, and it is not dangerous in any way.

If installed in connection with sprinkler-heads, every inch of space is *automatically* protected; if in connection with hose-stations, two or three hand-directed streams can be applied to any one place. Or it can be connected to *both* equipments.

It will give the best fire-fighting protection that can possibly be had.

It is not expensive to install, and costs but little to maintain.

It will handle any fire condition better than any other fire-fighting means known.

It will use *any solution*. It will also use plain water.

It can be tested at any time without impairing its efficiency, without waste of solution, and without putting the apparatus out

of service—an utter impossibility with the ordinary chemical fire extinguisher.

It does not have to be emptied, washed, and refilled if only a portion of the solution is used. The unused solution is always good and the tank is simply refilled to replace any used portion.

Its pressure is powerful and uniform from first to last.

It is *instantaneous*—no waiting for chemical action to create pressure. The pressure is ready and waiting to be used.

It is not a “new-fangled” idea in fire-fighting, but rather a new and better method of using old and proved means, utilizing four times as much carbonic-acid gas as can be had with ordinary chemical fire apparatus.

It is sold with the following—

GUARANTEE

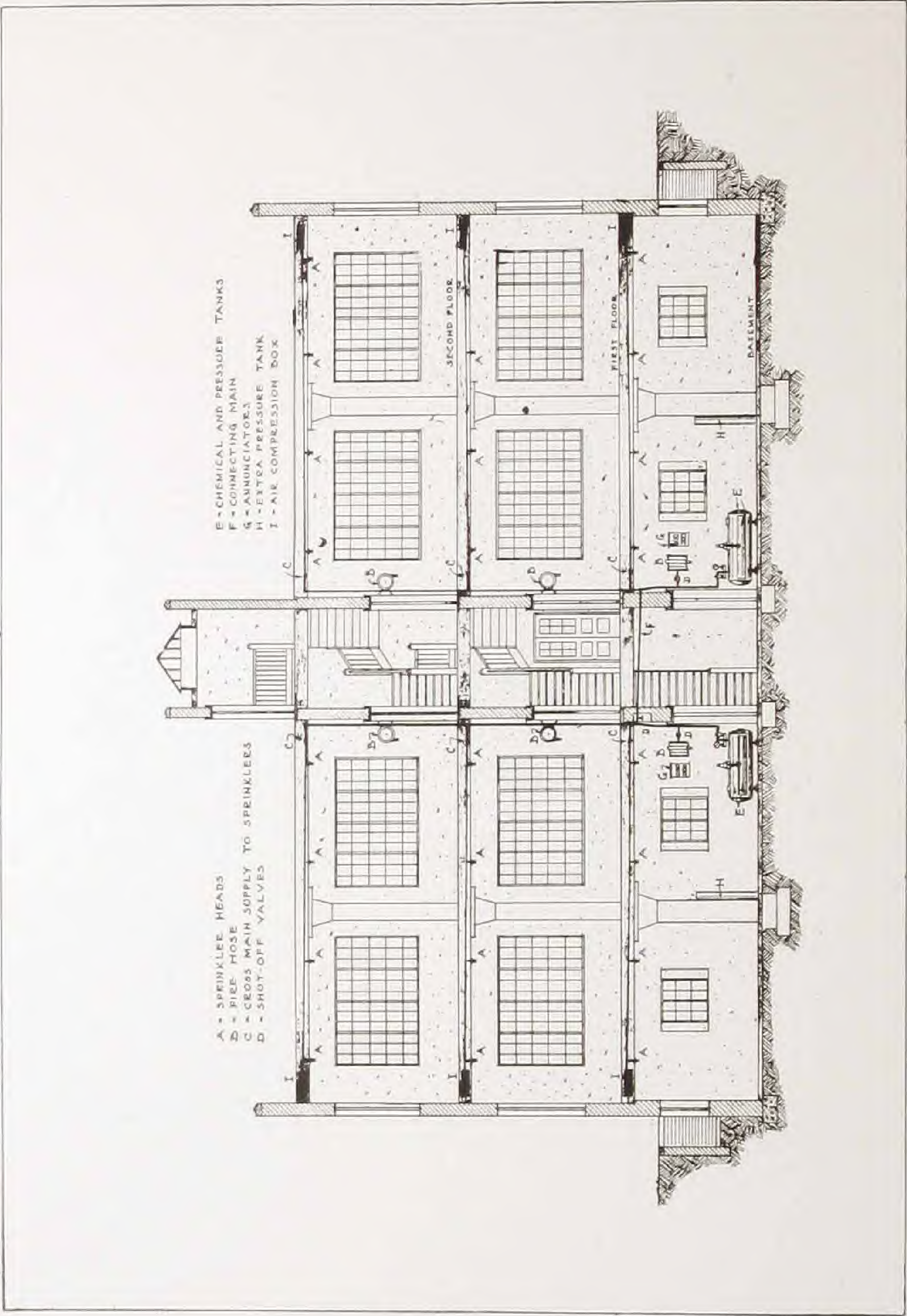
ALL installations of “Hi-Pressure” Stationary Chemical Fire Extinguishers are warranted to be free from defects in materials and workmanship, and to perform good and efficient service when properly used, and we agree to replace any broken or defective parts not caused by accident or misuse.

And we specifically guarantee that all “Hi-Pressure” Chemical Fire Apparatus has the following advantages and superiorities over any and all “soda-and-acid” chemical fire apparatus:

1. Greater fire-extinguishing efficiency.
2. More powerful and more uniform pressure.
3. Greater capacity in the same sizes of tanks, as no “gas-space” is required.
4. Greater ease and economy in handling.
5. Quicker action.
6. No waste. Unused chemical solution is never thrown away.
7. No possibility of damage or injury.

NATIONAL FIRE EXTINGUISHER COMPANY,


PRESIDENT



View of Typical Installation of "Hi-Pressure" Stationary Chemical Fire Extinguisher, showing chemical tanks, pipe system, hose-stations, and automatic sprinkler-heads.

“HI-PRESSURE” FIRE PROTECTION FOR ALL BUILDINGS

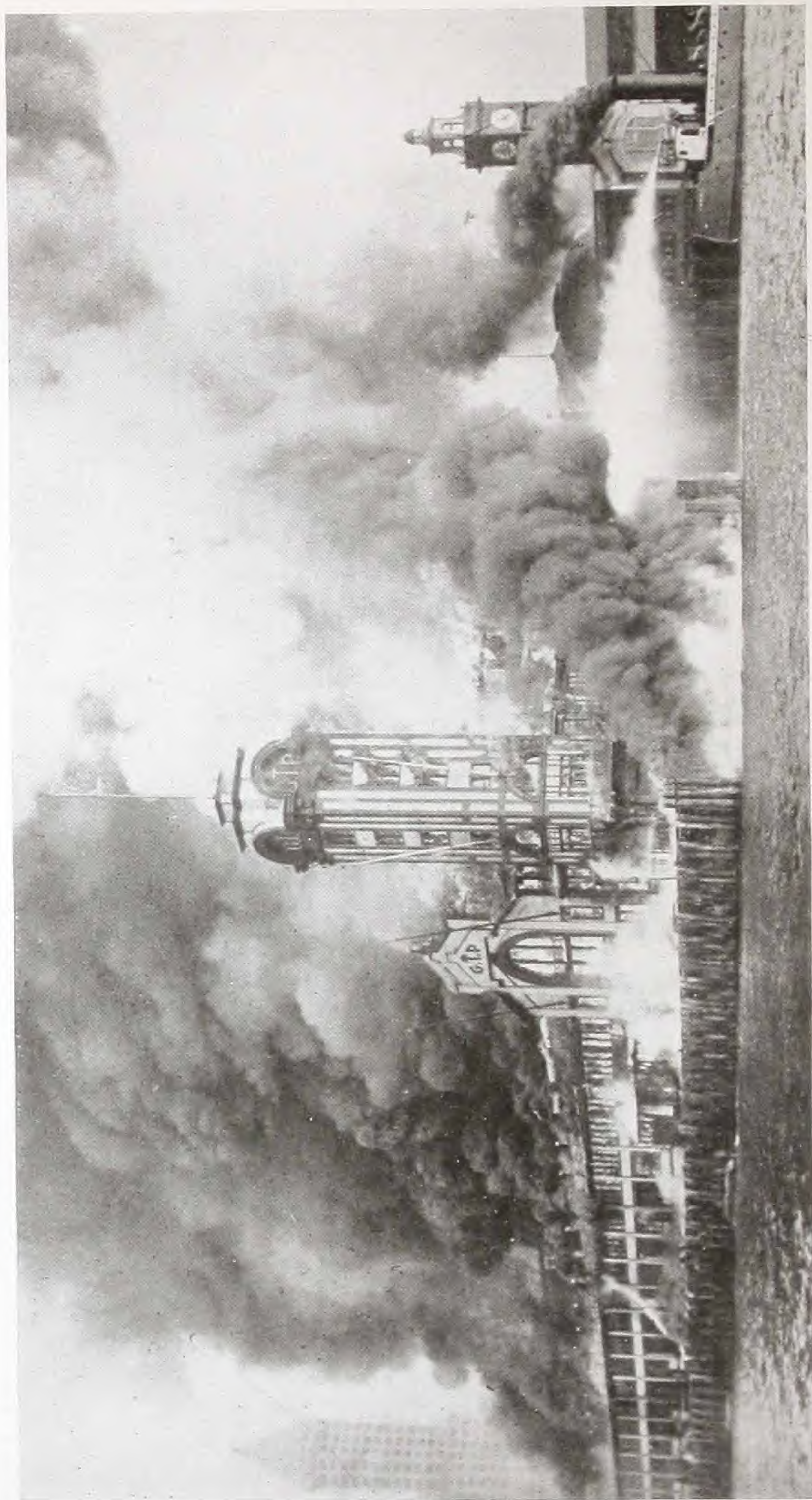
THE “HI-PRESSURE” Chemical Fire Extinguisher is adapted to all kinds of structures. Write us your fire protection needs for factory, store, or home. We can save you losses that no insurance can replace—interruptions of business, destruction of heirlooms, keepsakes, and mementoes of the home, perhaps the lives of members of your family.

THE “HI-PRESSURE” SYSTEM FOR CELLAR PROTECTION

MANY very dangerous fires in loft and factory buildings, warehouses, stores, tenements, etc., start in the cellar and gain considerable headway before discovery. Such fires are always difficult to fight by reason of dense and stifling smoke and on account of inaccessibility. Many large cities are now considering laws making it compulsory to install automatic sprinklers in cellars of this kind.

The “Hi-Pressure” Chemical Fire Apparatus is peculiarly adapted to this purpose, by reason of its low cost, its great fire-fighting efficiency on all kinds of fires, and its simplicity and positiveness of operation. In addition to the automatic sprinklers, a hose-station can be included, located conveniently at top of cellar-stairs, thus giving the protection afforded by the automatic sprinklers and the much more efficient stream directed by hand.

A building equipped with stand-pipes and hose-stations can have the automatic sprinkler equipment in the cellar, or in any particularly hazardous portion requiring special protection.



Photograph by Underwood & Underwood, N. Y.

This Magnificent Pier and Contents Were Entirely Consumed in One Hour! Hundreds of Thousands of Gallons of Water Had no Effect!! "Hi-Pressure" Chemical Fire Apparatus Would Have Saved It!

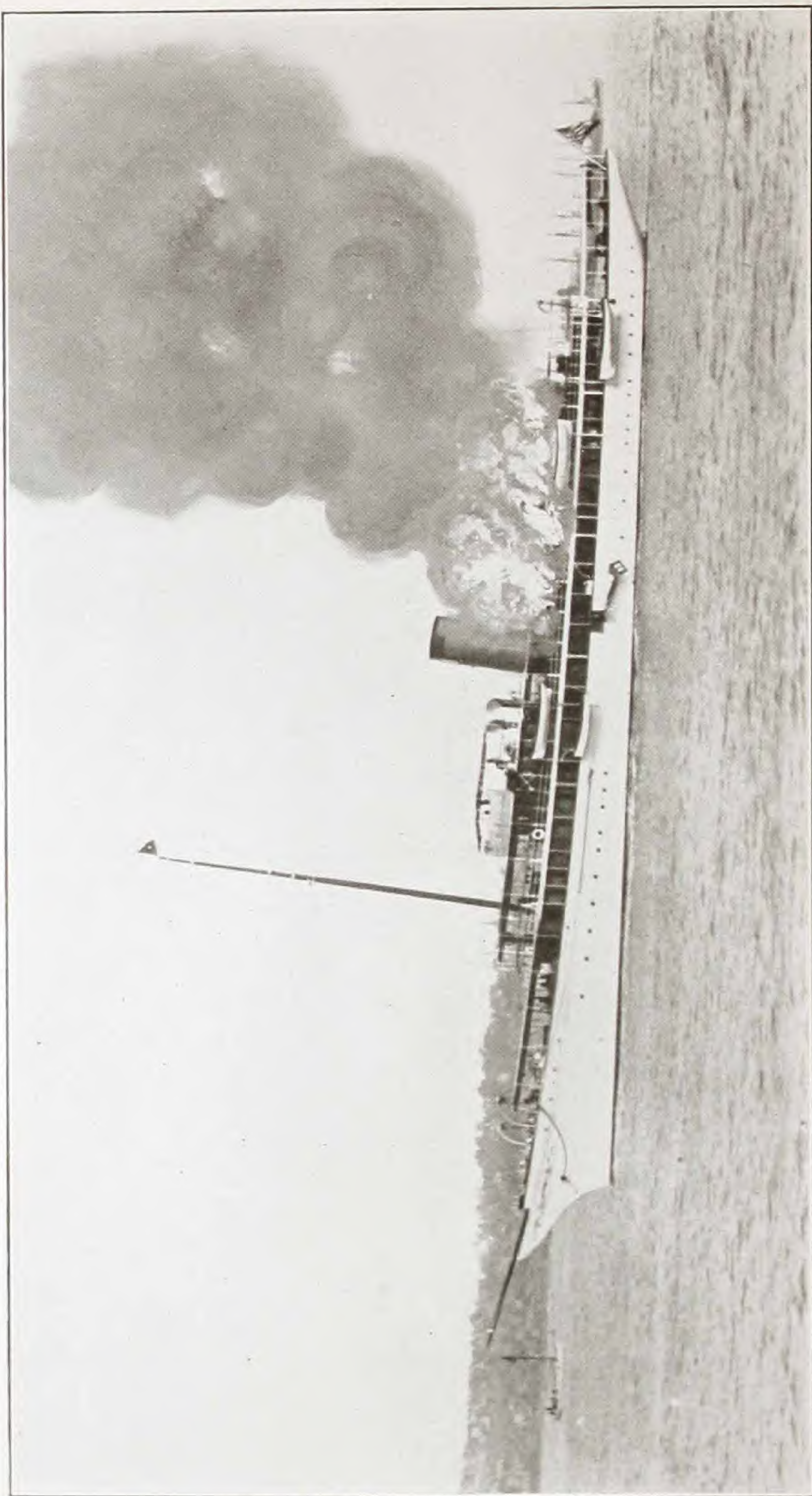
FIRES IN FREIGHT-HOUSES, STEAMSHIP AND RAILROAD PIERS

FREIGHT-HOUSES, steamship and railroad piers, and similar structures are peculiarly subject to very destructive fires. The miscellaneous assortment of freight, consisting largely of highly inflammable materials, including paints, oils, greases, spirits, etc., makes a little fire a very dangerous thing in such places.

The first available water-buckets, small hand-extinguishers, and water streams have little effect on such fires, and usually they gain tremendous headway and the entire structure and contents are doomed before the city fire department can answer the alarm.

Fires of this kind *must be extinguished in their incipency*, or not at all. The "Hi-Pressure" Chemical Fire Apparatus is very efficient in extinguishing such fires the moment they start, because the "Hi-Pressure" stream is instantly available, is from 80 to 160 times as efficient as water, and will put out oil and grease fires on which water has no effect.

We are prepared to give special attention to inquiries in regard to fire protection for this class of risks.



Photograph by Underwood & Underwood, N. Y.

The "Hi-Pressure" Chemical Fire Extinguisher is the only adequate fire-fighting protection for vessels of all kinds.

FIRES ON YACHTS AND OTHER VESSELS

THE mere thought of a fire at sea carries terror with it. People are usually quite helpless when a fire breaks out on board of a vessel of any kind, whether it be a small launch or an ocean liner, and the danger to human life is naturally much greater than in the case of a fire in a building.

The "Hi-Pressure" Chemical Fire Extinguisher is *the only* fire apparatus that can give *absolute protection* for risks of this nature. Special sizes of chemical tanks can be had for installation on private yachts, pleasure boats, etc. The piping is inconspicuous, and usually only one or two hose-stations are necessary.

We can furnish "Hi-Pressure" Chemical Fire Apparatus suitable for ocean, lake, and river steamships, as well as for launches, motor-boats, and sailing vessels. The rolling and pitching of a boat in the roughest weather cannot interfere with the efficient working of "Hi-Pressure" Chemical Fire Apparatus. A fire in the most inaccessible part of the hold of a ship will automatically set the "Hi-Pressure" apparatus into action and extinguish itself. Besides suitable hose-stations are provided, enabling the fighting of the fire by hand-directed streams of fire-extinguishing, non-injurious chemical solution many times more efficient than water.

No fire can gain headway against the efficiency of the "Hi-Pressure" Chemical Fire Extinguisher installed on a vessel.

The cost of "Hi-Pressure" *absolute fire protection* is very moderate.

“HI-PRESSURE” EQUIPMENT FOR YOUR OWN INSTALLATION

TO MEET the demand for a “Hi-Pressure” chemical fire equipment to be installed by the purchaser we have designed a 100-gallon apparatus, our standard type in every way, of ample capacity, and yet of a size that will permit its being readily shipped to all points and easily handled and set up by anybody.

The “Hi-Pressure” apparatus has a capacity *three times*, and a fire-fighting efficiency *four times*, as great as that of the chemical tanks ordinarily used on city fire department apparatus, and it is from 80 to 160 times as efficient as water. When installed in a building, this great fire-fighting efficiency is *instantly available* without any delay for water-connections, fire alarms, or the arrival of the city fire department. It is *the best* fire protection possible.

Upon receipt of a rough drawing and brief description of the building to be protected we will advise the proper number and locations of the required hose-stations and quote prices. The equipment will include absolutely everything necessary, and we send simple and complete instructions. If preferred, the piping can be supplied locally, and any plumber can install and connect the complete equipment.

Ask your plumber for full information. If he does not know about “Hi-Pressure” fire protection, write us—

NATIONAL FIRE EXTINGUISHER COMPANY
PHILADELPHIA, PA.

UNDENIABLE PROOF OF “HI-PRES- SURE” SUPERIORITY

A COMPARISON BASED ON A PRACTICAL
TEST ON ACTUAL FIRES

[SEE OPPOSITE PAGE]



No. 1: Two buildings exactly alike, 16 feet high and 14 feet square, packed evenly with strips—giving actual burning surface equivalent to that of *eight* ordinary rooms. Both buildings freely oiled, lighted at the same time, and allowed to burn three minutes, producing *real fires* deep in the fabric of the wood, and not mere surface blazes.



No. 2: Fire in building on *left* was fought with “soda-and-acid” $\frac{3}{8}$ -inch stream handled by expert city firemen; but such a fire is entirely too large for *any* “soda-and-acid” apparatus, and the building was *entirely consumed*.

Fire in building on *right* was fought with “Hi-Pressure” $\frac{1}{4}$ -inch stream. The fire was quickly extinguished, and building *saved intact*.

ACTUAL FIRE-FIGHTING WILL ALWAYS PROVE “HI-PRESSURE”
SUPERIORITY

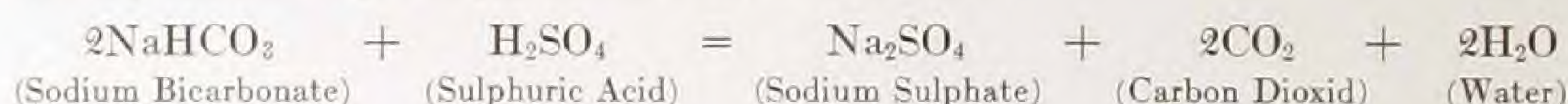
UNDENIABLE PROOF OF "HI-PRES-SURE" SUPERIORITY

A COMPARISON BASED ON THE EXACT MATHEMATICS OF CHEMISTRY

(From a Report by an Eminent Chemical Authority)

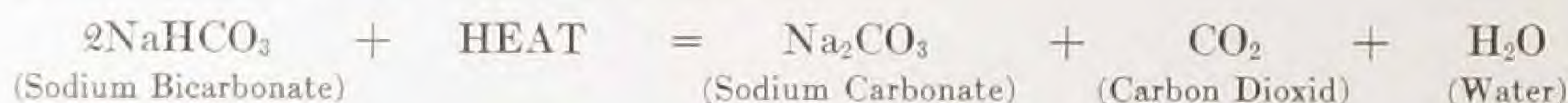
A. Air containing 4 per cent. of carbon dioxid (carbonic-acid gas) will not support the combustion of a burning candle.

The fundamental principle of *all* "soda-and-acid" chemical fire apparatus is the decomposition of bicarbonate of soda solution by means of *strong sulphuric acid*, as follows:



The carbon dioxid is generated in the chemical tank, and by far the greater portion of this gas is used for pressure; *only a small part*—that which is soluble in water—is delivered to the fire.

B. The fundamental principle of the "*Hi-Pressure*" Chemical Fire Apparatus is the decomposition of bicarbonate of soda solution by means of *heat*, as follows:



The solution of bicarbonate of soda is delivered to the fire by means of compressed air, and *all* the carbon dioxid is generated *on the fire*—the solution of bicarbonate of soda being decomposed at temperatures above 70° Centigrade (158° Fahrenheit). (Water boils at 100° Centigrade—212° Fahrenheit.)

A. The chemical action is similar in *all* "soda-and-acid" apparatus no matter by what mechanical or other means the mixing of the sulphuric acid and the soda solution is accomplished.

At 25° Centigrade (67° Fahrenheit) and at atmospheric pressure water dissolves 0.759 volume (measured at 0° Centigrade and 760 mm.) of carbon dioxid. Water *cannot* carry more carbon dioxid under these conditions of temperature and pressure. Therefore, a "soda-and-acid" tank will deliver on the fire only as much carbon dioxid as is soluble in water at the temperature of the stream and

at atmospheric pressure—the total equivalent of sodium bicarbonate thus used on the fire, with 100-gallon tank, being only 17 pounds.

A standard 100-gallon “soda-and-acid” chemical fire extinguisher tank is charged with 40 pounds of bicarbonate of soda dissolved in only 80 gallons of water, the tank necessarily being one-fifth (in some cases one-seventh) *empty*, to provide space for the carbonic-acid gas which is generated by mixing 20 pounds of sulphuric acid (vitriol) with the solution. If proper gas-space is not provided, the tank will be blown up when set into action.

B. A standard 100-gallon “Hi-Pressure” Chemical Fire Extinguisher tank is charged with at least 50 pounds of bicarbonate of soda dissolved in 100 gallons of water, the tank being *completely filled*, and *no sulphuric acid being used*. When the bicarbonate of soda solution from a 100-gallon “Hi-Pressure” tank is thrown on a fire, the entire 50 pounds of sodium bicarbonate is used on the fire.

NOTE.—*Although the solutions in both systems are of the same strength, and the tanks are of the same size, the “Hi-Pressure” system utilizes the full 100 gallons, instead of only 80 gallons utilized by the “soda-and-acid” system, and the full 50 pounds of bicarbonate of soda, instead of only 17 pounds.*

According to “Fire Prevention and Fire Protection—A Handbook of Theory and Practice,” by Joseph Kendall Freitag, B. S., C. E. (see page 937), pure bicarbonate of soda theoretically gives 26.7 per cent. CO₂ (carbonic-acid gas) and 63 per cent. sodium carbonate.

This would make the total equivalent of sodium bicarbonate utilized on a fire by a standard 100-gallon “soda-and-acid” fire extinguisher tank ONLY 10.68 POUNDS against the FULL 50 POUNDS utilized by the “Hi-Pressure” system.

It will be seen that, with chemical tanks of the same size, a *very much greater amount* of carbon dioxid is effective on a fire by means of the “Hi-Pressure” system than with the “soda-and-acid” system, besides using *25 per cent. more solution*; and it is evident, from the above figures, that the *greater efficiency* of the “Hi-Pressure” system *will extinguish much larger fires* than is possible with the same size of “soda-and-acid” tank.

The superiority of the "Hi-Pressure" System, *on the basis of bicarbonate of soda*, is shown by the following diagrams:

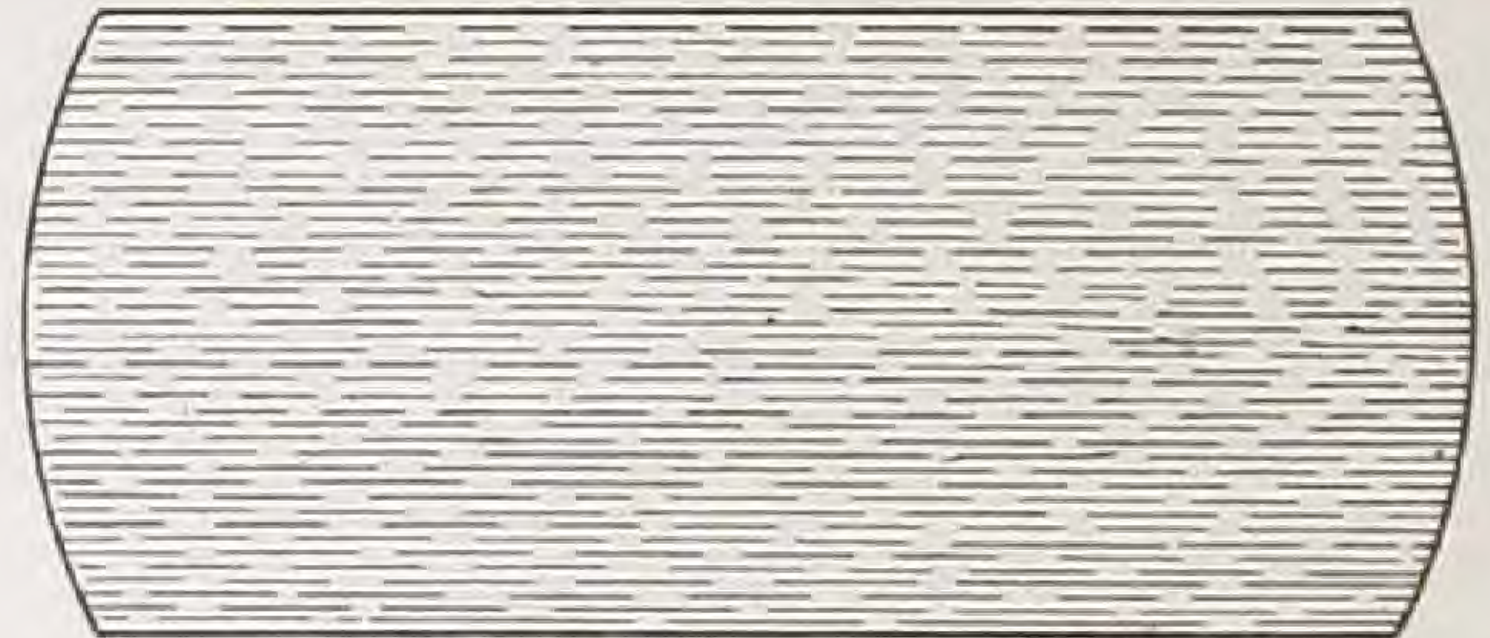
COMPARATIVE VOLUMES OF SOLUTION UTILIZED ON A FIRE

"Soda-and-Acid" Tank
100-gallon



80 gallons
Only 80 per cent. of capacity

"Hi-Pressure" Tank
100-gallon



100 gallons
100 per cent. of capacity

COMPARATIVE VOLUMES OF SODIUM BICARBONATE UTILIZED ON A FIRE

"Soda-and-Acid" Tank
100-gallon



1. 20-gallons empty space.
2. 46 gallons decomposed in generating pressure.
3. 34 gallons utilized on fire.

"Hi-Pressure" Tank
100-gallon



100 gallons utilized on fire.

COMPARATIVE WEIGHTS OF SODIUM BICARBONATE UTILIZED ON A FIRE

"Soda-and-Acid" Tank
100-gallon



17 pounds

"Hi-Pressure" Tank
100-gallon



50 pounds

ADDITIONAL ADVANTAGES OF THE “HI-PRESSURE” SYSTEM

1. It can use *any* water-soluble, non-corrosive, compatible fire-extinguishing substances.

2. It delivers a stream at a constant pressure of 100 pounds (or more) to the square inch, the pressure being controlled by an automatic regulating valve.

In *all* “soda-and-acid” apparatus the pressure varies according to the temperature of the bicarbonate of soda solution and the strength and quantity of the acid; and the pressure rapidly diminishes as the solution is emitted from the tank. At low temperatures the chemical action is retarded and the carbon dioxid is generated more slowly.

Fire insurance boards require that all “soda-and-acid” apparatus shall be recharged at least once a year, because the sulphuric acid absorbs moisture and is diluted, and when so diluted, the chemical action is less energetic, and the pressure therefore reduced.

3. The “Hi-Pressure” system uses compressed air or compressed carbon dioxid for pressure, the compressed gas in either case being contained in a separate cylinder connected to the chemical tank. The pressure can be applied to the solution in the tank and can be regulated and controlled automatically—*thereby delivering the stream at uniform high pressure.*

4. The “Hi-Pressure” system *uses no sulphuric acid.* It is a well-known fact that dilute sulphuric acid has a very corrosive action upon iron and other metals, making the use of lead-lined tanks necessary, and lead-lined pipes desirable, as the stream may carry sulphuric acid. If the quantity of sulphuric acid is reduced, the quantity of carbon dioxid is also reduced.

In a 250-gallon “soda-and-acid” system the proper charge of sulphuric acid is approximately 50 pounds! It is not necessary to suggest the risk involved in inexperienced people handling this dangerous chemical.

5. The “Hi-Pressure” tank is recharged only after use, and then merely to replace the quantity of sodium bicarbonate solution used; whereas the “soda-and-acid” tank has to be emptied, washed,

and completely recharged after once being set into action, and must be recharged at least once a year, whether used or not. All unused solution is an absolute waste.

6. The "Hi-Pressure" system can be tested and set in action without any impairment of efficiency or waste of solution. The "soda-and-acid" system can be properly tested only by setting it in action, which destroys the entire charge of solution and gives no test for the new charge.

7. "Soda-and-acid" chemical fire extinguisher streams are admittedly about forty times as efficient as water streams; so that it is safe to say that the "Hi-Pressure" stream has about 160 times the efficiency of water for fire-extinguishing purposes.

The foregoing is based upon the signed report of one of America's leading chemical authorities.

We are not at liberty to use his name in connection with any advertising matter, but will gladly give it upon request.

CONCLUSIONS OF THE LEADING FIRE INSURANCE UNDERWRITERS

ABOUT THE "HI-PRESSURE" SYSTEM

"THIS method of delivering water or chemical solution for fire-extinguishing purposes is *superior* to that more commonly used, in which sodium bicarbonate and sulphuric acid are employed, in the following particulars:

"(a) There is *no danger* of discharging acid which may cause damage.

"(b) A tank of given weight and strength is capable of delivering its contents at a *higher average pressure*, and therefore effectively at a *greater elevation*.

"(c) Assuming a proper reserve supply of air-cylinders, it can be *recharged more quickly*.

"(d) Opportunity for *utilizing more completely* such extinguishing power as may be possessed by carbonic-acid gas when liberated within a fire is here presented, in the opportunity for delivery of *unimpaired solution of sodium bicarbonate*.

“(e) Should it happen under unusual or emergency conditions that no chemicals of any suitable kind could be obtained for prompt recharging, this apparatus could be charged with *plain water*, and would still retain the merit of being *handled more easily and quickly* than the regular fire-hose.

“(f) This apparatus, if partially used, does not require complete recharging. *The tank may be replenished without removal of the contents remaining after a partial discharge.*”

FIRE TESTS

THE superiority of the “Hi-Pressure” Chemical Fire Extinguisher can be easily demonstrated to the satisfaction of any fair-minded person who will make adequate comparative tests, whether these tests be technical and based on the mathematics of chemistry, or practical and based on actual fires.

There are spectacular fire demonstrations—mere surface blazes—that prove nothing; but comparative tests on actual fires of ample size, which have been allowed to burn long enough until the fire is deep into the fabric of the wood, *do prove something*.

Just as we prove the comparative freezing-points of two liquids by *actually freezing* them, or the comparative breaking-strains of two pieces of metal by *actually breaking* them, so can we prove the comparative fire-extinguishing efficiency of two systems of fire apparatus by *actually extinguishing fires* with them.

A 200-gallon "Hi-Pressure" Chemical Fire Extinguisher has the fire-extinguishing capacity of 30,000 gallons of water!

The "Hi-Pressure" Apparatus gives you the full benefit of all this efficiency, either through hand-hose or automatic sprinklers, or both, and cheaper, quicker, and better than it can be had in any other way

Adequate fire apparatus WITHIN A BUILDING *is better than a city*
fire department on the next block!

